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The deaths in cities were 1,159; in 75 towns, 496; in 300 villages, 426; making a total of 2,081 of urban fatalities. In the remainder of the Province there were 2,241 deaths. Of the towns there were only 14 which reported no deaths, indicative of the widespread prevalence of the disease. It was least fatal in villages, of which 201 reported no deaths, while out of 315 rural municipalities 24 escaped.

A chart prepared to show the duration of the cases, on which the record of 3,061 cases is given, indicates that the disease was particularly fatal up to the fourteenth day, and that the crisis occurred on the seventh and tenth days, on which days the greatest number of deaths took place. After the fourteenth day the number of deaths decreased very rapidly. It may be mentioned that the registrar learns only of the fatal cases, and that "duration of a case" means the time from the date of the first attack until the date of death.

INFLUENZA IN THREE CHICAGO GROUPS.¹

By EDWIN O. JORDAN, Consultant Bacteriologist, United States Public Health Service, and DUDLEY B. REED and E. B. FINK.

Opportunity was afforded the authors for the study of influenza prevalence in three different population groups in the city of Chicago: (1) The Student Army Training Corps at the University of Chicago; (2) the high and elementary schools of the University of Chicago; (3) the Chicago Telephone Co. These several groups are quite distinct as regards age, degree and nature of association of the individuals within each group, and general opportunities for exposure to infection. So far as known there was no point of contact between the groups.

I. THE STUDENT ARMY TRAINING CORPS.²

In October, 1918, influenza broke out in a group of the Student Army Training Corps at the University of Chicago. This group, known as section B, comprised 234 men, nearly all about 20 to 22 years of age, coming mostly from small cities, towns, and rural districts in Illinois. They were housed in five different places—remodeled houses and apartment buildings. The number of occupants to a room varied somewhat, being usually about four to eight. Although sleeping in five separate buildings, they were all closely associated in their technical class work and at meals. The men for the most part came directly from their homes, arriving in Chicago October 15 and 16. Three of the men were ill on their arrival, in two cases with

¹ Influenza investigations, United States Public Health Service.

² By Edwin O. Jordan and Dudley B. Reed.

symptoms that as described seemed influenza-like. On the evenings of October 16 and 17 all men in the group were brought into especially close contact in the locker room of the university gymnasium while waiting for their physical examination.

The date of onset was determined by individual questioning in each case and could usually be fixed by the patient within a few hours, as is characteristic of influenza. The cases developed as follows:

Date of onset.	Number of cases.	Date of onset.	Number of cases.
Oct. 15-16.....	13	Oct. 20.....	22
Oct. 17.....	10	Oct. 21.....	13
Oct. 18.....	14	Oct. 22.....	4
Oct. 19.....	29	Nov. 4.....	1

¹ Ill on arrival in Chicago.

NOTE.—No definite information, 9.

The situation became known to the university authorities on October 20, and all the affected men were removed to an emergency hospital.

Daily temperatures were taken of the rest of the group for one week. Isolation followed any sign of fever. The number of men in each building at the beginning of the outbreak and the corresponding number of cases were as follows:

Building.	Number of men.	Number of cases.	Building.	Number of men.	Number of cases.
A.....	15	5	C.....	19	4
B {Upper.....	61	29	E.....	40	17
{Lower.....	30	11	F.....	51	16

In each of three buildings (lower B, E, and F—121 men) 1 man was ill on arrival; in these houses 8 cases developed on October 17; in the remainder (A, upper B, and C—95 men), with no known cases of illness before October 17, 2 cases developed on the 17th. In the later cases the time and place distribution did not give any indication that infection occurred principally in sleeping quarters.

The chief symptoms accompanying onset were (100 cases):

Headache.....	66
Muscle pains.....	56
Sore throat.....	37
Cough.....	34
Nosebleed.....	8

Fever, ranging from 100° to 104° was present in all these cases. The face was usually deeply flushed and the conjunctiva more or less injected.

Information was obtained about previous illness in 87 cases. In eight instances there had been definite illness within a year: Malaria, 3; measles, 2; rubella, 1; mumps, 1; bronchitis, 1. Prior to January, 1918, there had been, in addition to the usual diseases of childhood, typhoid, 5; scarlet fever, 4; diphtheria, 2; pneumonia, 6; "grippe," 3. In two cases tonsils had been removed. Two men gave a history of frequent colds in winter. In the group as a whole there was no evidence of respiratory tract ailments just prior to the outbreak.

Meals were served to these men in a separate building located several blocks away from their dormitories. Mess kits were not used. The food and general supervision were the same as for the rest of the student community, including Section A of the Student Army Training Corps. The men had nothing to do with the washing of dishes and tableware, which are known to have been thoroughly cleansed in boiling water.

During the epidemic period another group (Section A) of the Student Army Training Corps were likewise under observation. The majority of this group (685) were housed in dormitories and fraternity buildings under conditions very similar to those obtaining in Section B. Their classrooms and eating places were entirely apart from those of Section B, and the men of the two groups came into no sort of formal contact with one another. The cases of influenza among 685 men in Section A occurred as follows:

Week ended—	Cases in Section A.
Oct. 5.....	7
Oct. 12.....	10
Oct. 19 ¹	7
Oct. 24.....	4
Nov. 2.....	2
Nov. 9.....	3

The number affected in the different dormitories used by Section A is as follows:

	Approximate number of men.	Number of cases of influenza.
H.....	215	² 14
S.....	120	6
M D.....	50	4
N D.....	100	4
S D.....	100	3
P.....	100	2
	685	² 33

¹ Week of maximum prevalence in Chicago.

² These cases developed on well-scattered dates between Oct. 6 and Nov. 8, never more than 2 in one day.

³ Two of these cases developed pneumonia; there were no deaths.

In addition to this number, there were 271 men of Section A living in barracks—half of this number after October 20, the other half after October 29. But two cases of influenza developed in this group, both on the same day (Nov. 8). At the time these men entered the barracks, influenza in Chicago had decreased considerably from the maximum. Beginning with the assembling of the students, October 1, and continuing throughout the epidemic period, special care was taken to detect cases of incipient illness. Frequent talks were given to men and officers, and all men of Section A with any sign of illness, objective or subjective, were instructed to report to the medical officer and, whether cases of "simple colds" or suspected influenza; they were at once isolated in the hospitals or sent to their homes. During the whole period, lectures and other classes were held as usual, one group of 350 men meeting three times a week.

The groups may be compared as follows:

	Section A.	Section B.
Number of men.....	685	234
Cases of influenza developing Oct. 17-22.....	2	93
Total cases of influenza developing Oct. 17-Nov. 8.....	26	193
Cases of pneumonia.....	2	12
Deaths.....	.....	2

¹ In 9 others the exact date of onset could not be ascertained.

The mode of housing was similar in the two groups; the food supply was under central supervision and the men themselves had nothing to do with its preparation or serving; neither group received any specific or mixed influenza vaccines. The cases of illness that developed in Section A were quickly isolated, whereas in Section B isolation was less early and much less complete.

Cessation of influenza in Section B followed immediately after the isolation of all cases and the inauguration of daily inspection. The natural immunity of the men of Section B, who had not become infected before October 21, was undoubtedly relatively high.

A third group of students, men and women, not living in barracks nor for the most part in dormitories, but at their own homes or in boarding houses, gave the following record:

Number of students.....	82
Cases of influenza.....	7
Cases of pneumonia.....	1

The case incidence is here somewhat higher than in Section A where the greater restrictions placed upon individual movement unquestionably decreased the amount of contact with the civilian community. The general degree of health supervision was also less than in the Student Army Training Corps unit.

Comparison of these two groups (Section A and civilian students) with the heavily affected Section B, in which the case incidence was about six times as great as in the civilian students' group and 13 times as great as in Section A, indicates the importance of early detection and isolation of influenza cases as a preventive measure.

II. THE UNIVERSITY HIGH AND ELEMENTARY SCHOOLS.¹

The University of Chicago through its school of education maintains an elementary and a high school. In the office of the director of physical education careful records of all illnesses among students are kept. Whenever a student is absent from class the teacher fills out a form slip and reports to the school physician. Each day the office secretary makes telephone inquiries as to the causes of absences. This information obtained from the family and the attending physician is recorded on the same form. Students returning after absences are required to report to the office of the school physician for examination. Cases of illness developing during school hours are always examined for the detection of contagious diseases, a woman physician being in attendance for girls. A permanent daily record of all illnesses, by classes and causes of illness, is kept on file.

The data contained in these records have furnished an opportunity for an epidemiologic study of influenza during the autumn quarter, 1918, as it affected a select group of individuals. The student body consists of boys and girls in the immediate neighborhood of the university, many of them from the families of members of the university faculties. The clientèle of the school is such that physicians are more likely to be consulted for minor illnesses than is the case with children in public schools.

Elementary school.—The autumn quarter began October 1 and ended December 20, 1918, covering a period of approximately 12 weeks. At the beginning of the quarter there were registered 391 pupils, of whom 199 were boys and 192 girls, the youngest being 4 years and the oldest 13 years old. Ninety-seven cases of influenza were reported, a morbidity rate of 24.8 per cent. There were 50 cases among boys and 47 among girls.

¹ By Edwin O. Jordan and E. B. Fink. The authors acknowledge their indebtedness to Dr. W. J. Montlaw, physical director, for the opportunity to use his admirable records.

TABLE 1.—*Cases of illness developing in elementary school, by months and grades, from specified causes during autumn quarter, 1918.¹*

Class.	Number of pupils. ¹	Ages.	Influenza.			Colds.			Nonrespiratory.		
			October.	November.	December.	October.	November.	December.	October.	November.	December.
Kind'garten	32	4-6	2	2	6	8	12	5	7	2	1
1.....	24	6-7	3	4	9	5	33	4	5	6	6
2.....	51	8	6	2	3	19	11	6	12	1	7
3.....	30	8-9	1	2	2	11	8	6	3	1	4
4.....	57	9-10	2	10	4	16	12	11	2	7	1
5.....	53	10-11	4	4	5	10	10	8	15	6	4
6.....	58	11-12	8	8	.....	19	10	10	5	10	9
7.....	56	12-13	5	3	2	16	15	5	11	8	6
Total...	366	4-13	31	35	31	104	112	55	60	41	38

¹ Blank space indicates no cases. "Colds" includes respiratory infections other than influenza, such as pharyngitis, laryngitis, and bronchitis. "Nonrespiratory" includes headaches, accidents, intestinal disturbances, etc. "Number of pupils" are those on the rolls in the middle of the autumn quarter.

Table 1 shows the distribution of illness by months according to grades together with the number and ages of the pupils in each grade. Under the heading "colds," are included "pharyngitis" and "laryngitis" (9 of pharyngitis and 26 of laryngitis). Combined in age groups 4-9 (137 pupils) and 9-14 (229 pupils), the former had 42 and the latter 55 influenza cases, making the attack rate higher in the younger children (307 against 240). Compared by months, November showed the largest number of cases, and of these there were more in the kindergarten and grade 6B than in the other classes. The month of highest incidence of colds corresponds with the month of greatest prevalence of influenza, and the age and class distribution are about the same; the seventh grade pupils, varying in age from 12-13, had as many colds as the fourth grade, both being highest, with 44 cases each.

A comparison of the number of days of illness due to influenza and colds shows that in October, 31 cases of influenza caused 555 days of illness as against 78 cases of colds with an illness of 520 days; in November the ratio was 35 cases of influenza with 502 days of illness and 78 colds with an illness of 499 days; in December, 31 cases of influenza resulted in 494 days of illness compared with 60 cases of colds and 360 days of illness. The average period of illness was more than twice as long in influenza as in colds. The number of days of illness caused by influenza is 555 as compared with 825 days from all other causes during October, 502 to 816 in November, and 494 to 502 in December. There were 12 instances in which 2 children and 1 instance in which 3 children in the same family were reported ill with influenza. One girl 7 years old had 3 attacks of so-called influenza, and 1 boy 5 years old had 2.

TABLE II.—*Date of development of influenza by weeks, autumn quarter, 1918, as compared with colds, autumn quarter, 1918 and 1917, elementary schools.*¹

Class.	Week ended, 1918—													Total.
	October.				November.					December.				
	5	12	19	26	2	9	16	23	30	7	14	21	28	
K. G. Influenza	1	...	1	...	...	1	1	...	...	3	2	1	...	10
Colds	1	2	2	2	1	2	5	3	1	3	2	...	...	24
1. Influenza	...	...	2	1	1	...	1	...	...	2	3	1	5	16
Colds	...	1	2	2	...	4	6	1	2	1	2	1	...	22
2. Influenza	3	2	1	...	...	...	...	...	2	3	...	...	...	11
Colds	4	6	4	4	2	...	1	3	...	3	3	...	...	30
3. Influenza	...	...	1	...	1	1	...	...	...	1	...	...	...	5
Colds	2	5	3	...	...	1	3	2	2	4	1	1	...	24
4. Influenza	...	2	...	...	...	1	...	...	2	7	2	...	...	16
Colds	3	7	3	1	...	...	3	6	3	5	4	2	...	37
5. Influenza	2	...	1	1	...	...	2	1	1	2	2	1	...	13
Colds	3	3	2	2	1	...	5	2	4	2	4	2	...	30
6. Influenza	4	3	...	1	1	...	...	3	4	...	...	...	...	16
Colds	5	6	3	3	...	...	2	4	3	5	5	...	...	36
7. Influenza	3	1	1	...	...	...	...	...	3	1	1	...	...	10
Colds	2	4	...	1	3	...	2	2	...	4	...	1	...	19
Total:														
Influenza	13	8	7	3	3	3	4	6	19	15	6	10	...	97
Colds	20	34	19	15	7	7	27	23	15	27	21	7	...	222
Colds, 1917	15	23	17	12	12	15	21	10	6	15	19	5	1	171

¹ During the autumn quarter, 1917, there were 2 cases of "grippe" reported in the elementary school—1 with an illness of 6 days, the other 11 days.

Table II and Charts 1 to 3 show the development of cases of influenza by weeks during the autumn quarter, 1918, and of colds for the same period and for the corresponding quarter, 1917. During the first week of school in 1918, 13 cases of influenza were reported. Following this there was a gradual decline, extending over a period of 3 weeks, to the level of 3 cases, where it remained for 2 weeks; then in the 2 weeks following it went up to 4 and 6, respectively, and suddenly, during the week ended November 30, jumped to 19 cases, followed by a decline extending over 3 weeks to 10 cases during the last week of the quarter. The epidemic was characterized by a moderate outbreak during the first week of school, followed by a decline extending over 2 weeks to a low level, which was maintained for 5 weeks, and then a sudden peak, reaching the highest point in the epidemic during the week ending November 30, followed by a decline extending over 3 weeks. While the height of the epidemic of influenza in the city at large was reached during the week ending October 26, as shown by the mortality from influenza and pneumonia, the epidemic among this particular school population did not reach its highest level until the week ending November 30. During the week of maximum mortality in Chicago, the number of cases developing among the school children was low, the maximum being reached 5 weeks later. Whether, as is probable, this has any relation to the prevalence of influenza in the portion of the city where the school is located is not certainly known; it was noted, in general, that the

epidemic did not develop in certain districts of the city until after it had subsided in others.

Chart 2 shows that colds in 1918 rose to a high point during the first week, reaching their highest level during the second week, followed by a sharp decline to the lowest level at the fifth week, where they remained 1 week to rise sharply to a second peak at a lower level than the first one, followed by another sharp decline over 2 weeks to about one-half the lowest level, and in the next week a third peak to about the level of the second, fol-

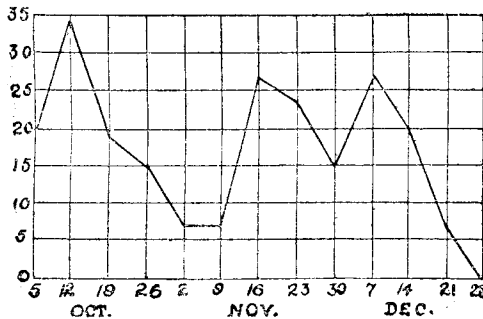


CHART 2.—Development of colds (including other respiratory infections), by weeks, elementary school, autumn quarter, 1918.

lowed by a rapid decline in the last two weeks of school. A comparison of the curves for influenza and colds shows that the period of highest incidence of colds was in the second week of school and preceded the corresponding period for influenza by 7 weeks. There are 3 peaks in the curve for colds and only 2 in that for influenza. The period of highest incidence of colds follows the first peak in the influenza curve by 1 week, while during the week of greatest prevalence of influenza there is a sharp fall in the number of cases of colds. The third peak in the curve for colds occurs just 1 week after the height of the influenza curve. The curve for colds as a whole runs at a higher level than that for influenza. A striking thing is that the portion of the curve for influenza contained within the period November 23 to December 7 is almost the exact opposite of the corresponding portion in the curve for colds. How much of this is due to the factor of diagnosis is difficult to say.

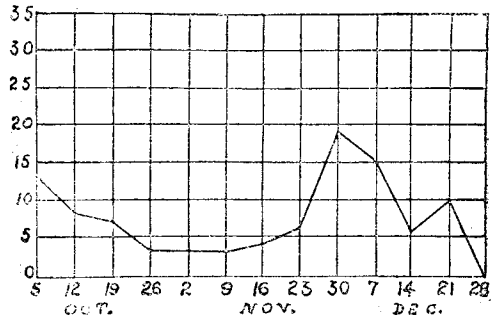


CHART 1.—Development of influenza, by weeks, elementary school, autumn quarter, 1918.

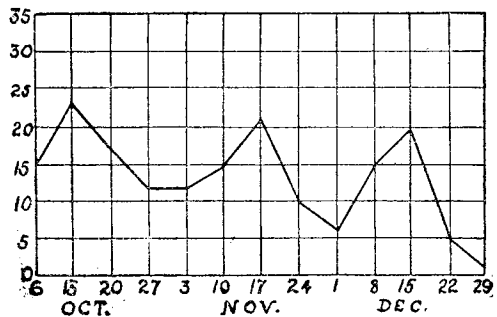


CHART 3.—Development of colds (including other respiratory infections), by weeks, elementary school, autumn quarter, 1917.

The curve for colds in the autumn quarter, 1917, has in general the same outline as the one for 1918. It, too, contains three peaks, the first two occurring at exactly the same time, the last a week later. Colds in 1918 were at a higher level than in 1917. The figures for 1917 and 1918 are closely comparable, since they deal largely with the same individuals. About 100 pupils leave school annually, about 50 graduating. The majority of new pupils enter the kindergarten; the rest replace children who have moved or leave for various reasons. The exact number of pupils in 1917 is 380 compared with 391 in 1918, about 300 being the same in both groups.

There are 21 teachers in the elementary school, and among these 5 cases of influenza were reported. Two occurred in the second week of October, 2 in the second week of December, and 1 in the fourth week of December, with a total illness of 61 days. Two were second-grade teachers, one was a substitute, one special, and one a teacher of physical culture. There were no complications and no deaths. As far as could be determined, there seemed to be no evidence that any of the teachers acted as a focus of infection.

Of the 97 cases of influenza reported among the grade-school pupils, none developed pneumonia and there were no deaths.

High school.—At the beginning of the autumn quarter, 1918, there were 427 students registered in the high school, of whom 199 were boys and 228 girls. In age they varied from 14 to 18 years. Many of the children graduating from the elementary school continue in the high school. Ninety-one cases of influenza were reported, a case incidence of 21.3 per cent. A slightly larger number occurred among girls, the exact ratio being 41 for boys and 50 for girls, making the attack rate approximately the same for the two sexes.

During the same period there were 189 cases of colds as against 118 for the corresponding period in 1917.

TABLE III.—Comparative number of cases of influenza and colds, autumn quarter, 1918 and 1917, by weeks and sex, in high school.

	Week ended—														Total.
	October.				November.					December.					
	5	12	19	26	2	9	16	23	30	7	14	21	28		
Influenza:															
Boys.....	6	5	....	1	....	1	2	1	8	4	6	5	2	41
Girls.....	17	3	4	4	1	1	2	....	8	1	5	3	1	50
Total.....	23	8	4	5	1	2	4	1	16	5	11	8	3	91	
Colds, 1918:															
Boys.....	8	6	10	7	3	1	1	1	2	13	11	7	6	76	
Girls.....	7	7	10	6	4	3	4	6	13	21	17	10	3	111	
Total.....	15	13	20	13	7	4	5	7	15	34	28	17	9	187	
Colds, 1917: ¹															
Boys.....	....	....	2	4	13	4	5	....	9	5	8	3	10	62
Girls.....	1	5	1	5	4	4	6	5	6	8	6	5	....	56
Total.....	1	5	3	9	17	9	6	14	11	16	9	15	3	118	

¹ In 1917, 2 cases of "grippe" were reported, 1 with an absence of 4 days, the other 1 day.

Chart 4 illustrates graphically the curve of influenza by weeks. The week of highest incidence was the first week of school with 23 cases. This was followed by a sharp drop over a period of 2 weeks to a low level. A second peak occurred during the week ended November 30 with 16 cases, after which the epidemic rapidly subsided. A comparison with the course of influenza in the elementary school shows that in the high school the epidemic was most marked in the beginning, the secondary outbreak being less severe. The reverse was true of the elementary school—both peaks occurred

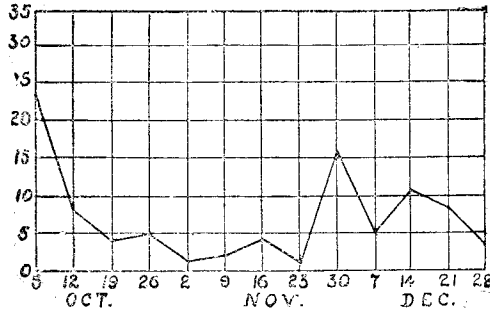


CHART 4.—Development of influenza, by weeks, high school, autumn quarter, 1918.

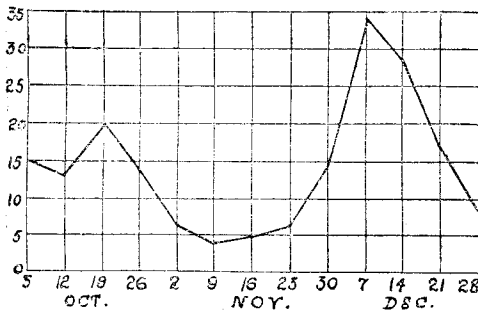


CHART 5.—Development of colds (including other respiratory infections), by weeks, high school, autumn quarter, 1918.

of influenza. Both correspond with sharp falls in the influenza curve. Colds in 1917 followed a much more irregular course, never reaching the maximum height shown during 1918.

In October, 40 cases of influenza resulted in a loss of 331 school days as compared with 76 cases of other respiratory infections, including colds, which caused a loss of 236 school days, and 72 cases, including all nonrespiratory illnesses, with an absence of 118 days.

In November, 24 cases of influenza resulted in a loss of 118 school days, 46 cases of other respiratory diseases, 163 days, and all others

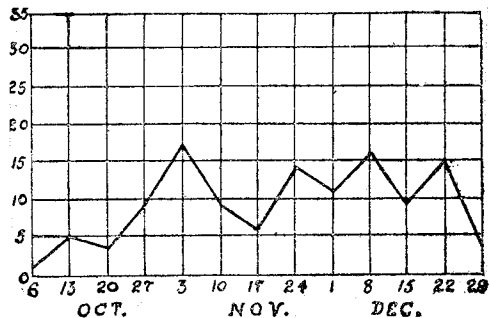


CHART 6.—Development of colds (including other respiratory infections), by weeks, high school, autumn quarter, 1917.

combined totaled 59 cases and 112 days absence. In December, 27 cases of influenza resulted in an absence of 188 school days, other respiratory diseases 94 cases with a loss of 187 school days, while all other illnesses were 66 cases and 90 days lost. Almost as many school days were lost in October through influenza as from all other causes combined; during November the ratio was less than one-half, and during December about two-thirds.

All cases of influenza recovered. Two cases of pneumonia were reported, both in girls. These were carefully investigated. One apparently started as a bronchitis, while the other undoubtedly began as a severe influenza with chills, high temperature, prostration, and general muscle pains. On account of its severity this case was diagnosed as pneumonia from the beginning.

Out of a total of 42 teachers in the high school, 6 developed influenza and all recovered.

An interesting feature of the figures given above is the rise in influenza cases in both the high and elementary schools about November 30, following the Thanksgiving recess from Wednesday to Monday. The parties and family gatherings at that time apparently afforded a better opportunity for influenza infection than the routine school life before and after the holiday period.

All the facts gathered afford no evidence that the schools served as distributing points for influenza infection.

III. THE CHICAGO TELEPHONE CO.¹

The Chicago Telephone Co. maintains a sickness benefit system, to which all employees who have been with the company for a period of two years or more are eligible. For administrative purposes complete records of all cases of illness developing among employees entitled to benefits are kept in the company's health department. Examination of these records has enabled us to determine the course of the influenza epidemic in Chicago in an occupational group of the adult population.²

The figures cover the period from September 1, 1918, to the middle of March, 1919, or 26 weeks. In January, 1919, which represents about the middle of the period covered, the Chicago Telephone Co. had in its employ 14,208 individuals—3,927 males and 10,281 females. Of the total number of employees, 53 per cent, or 7,530, were eligible to sickness benefits. Approximately 80 per cent of the men, or 3,141, are entitled to disability benefits; and 40 per cent, or 4,112, of the women. This difference is the natural result of the type of work in

¹ By Edwin O. Jordan and E. B. Fink.

² The authors are greatly indebted to Mr. S. J. Larned for opportunity to examine these records and to Mr. H. W. Bang, Miss K. O'Rourke, and Miss K. Ryan for valuable aid in assembling the data.

which the two sexes are engaged. The work done by the men is a specialized type of skilled labor, and the turnover is small. Shifting of the women workers is much more frequent.

The data include approximately 7,500 individuals of working age. Among these there developed a total of 1,448 cases of influenza (including "la grippe") during the period under consideration, an

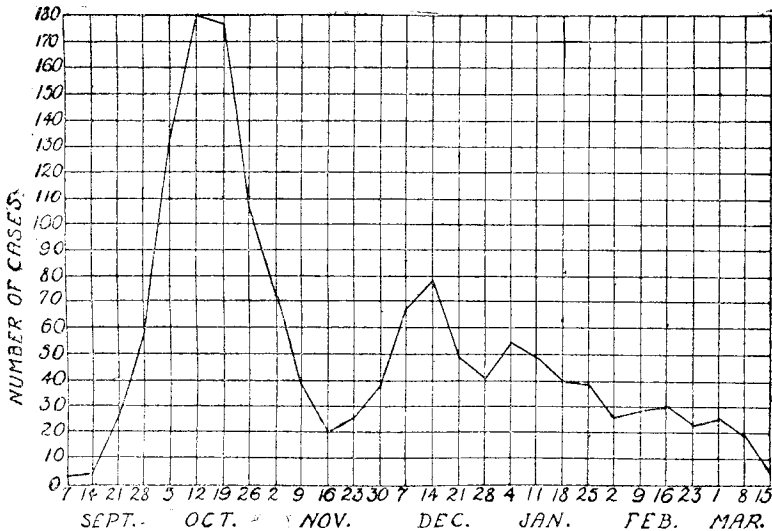


CHART 7.—Development of influenza, by weeks, Chicago Telephone Co., Sept. 1, 1918, to Mar. 15, 1919.

attack rate of 19.2 per cent. There were 22 deaths attributed to influenza and influenza-pneumonia, a mortality of 1.5 per cent.

Table IV and Chart 7 illustrate the development of influenza cases by weeks. The epidemic was characterized by two distinct peaks. The first and higher began the third week in September and shot up

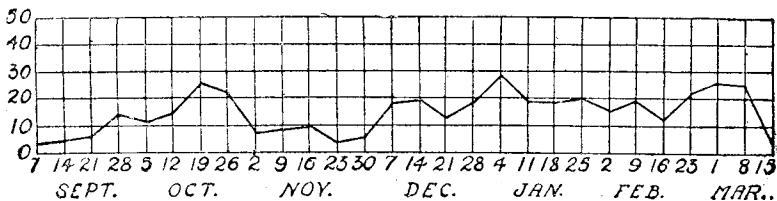


CHART 8.—Development of colds (including other respiratory infections) by weeks, Chicago Telephone Co., Sept. 1, 1918, to Mar. 15, 1919.

to a maximum of 180 cases for the week ending October 12, approximately four weeks after the beginning of the epidemic. The decline of the first wave was almost as sharp as its beginning and extended over a period of five weeks, reaching its lowest level during the week ended November 16. The rise of the second wave also covered a

period of four weeks, reaching its maximum in the week ended December 14. The maximum number of cases developed during this week was 78, or less than one-half the height of the first peak. Following the second peak there was an irregular, but gradual decline, extending over a period of 12 weeks.

During the same period there was a total of 402 colds (including all other acute respiratory infections except influenza). Chart 8 shows the development of these cases by weeks. The curve follows an irregular course at a low level with only two distinct peaks—the first, one week after the maximum week of influenza, and the second, three weeks after a similar peak in the curve for influenza. During the corresponding period in the preceding year, 1917–18, a non-epidemic year, there was a total reported of 300 cases of influenza and “la grippe” and 219 colds.

TABLE IV.—*Date of development of cases of influenza and colds (including all other respiratory infections) during the period Sept. 1, 1918, to Mar. 15, 1919, by weeks, Chicago Telephone Co.*

Week ended—	Influenza.	Colds.	Week ended—	Influenza.	Colds.
Sept. 7.....	2	2	Dec. 14.....	78	19
Sept. 14.....	3	3	Dec. 21.....	49	13
Sept. 21.....	26	5	Dec. 28.....	41	18
Sept. 28.....	58	13	Jan. 4.....	54	28
Oct. 5.....	134	11	Jan. 11.....	49	18
Oct. 12.....	180	14	Jan. 18.....	40	18
Oct. 19.....	176	25	Jan. 25.....	39	20
Oct. 26.....	105	22	Feb. 2.....	26	15
Nov. 2.....	71	7	Feb. 9.....	29	10
Nov. 9.....	38	9	Feb. 16.....	30	12
Nov. 16.....	20	10	Feb. 23.....	23	22
Nov. 23.....	25	4	Mar. 1.....	25	25
Nov. 30.....	38	6	Mar. 8.....	19	24
Dec. 7.....	66	17	Mar. 15.....	4	3

RECAPITULATION.

	Influenza.	Colds.
Total.....	1,448	402
Minimum.....	2	2
Maximum.....	180	23

A comparison of the number of days lost on account of influenza and colds indicates that in 1,177 cases of influenza about which we were able to obtain a record of the period of disability, a total of 27,154 working days was lost, while 346 colds resulted in a loss of 7,374 days. The average number of days lost per case of influenza was 23, and per case of colds, 21. During the six months September, 1918, to February, 1919, inclusive, there was a total loss of 79,253 working days from illness of all kinds; influenza was responsible for 34 per cent of the total loss. A comparison of the total number of days' disability in 1917 and 1918 by months shows that during October, 1918, the month during which the influenza epidemic was at its

maximum, there were more than twice as many days lost as in October, 1917. The effect of the entire epidemic is reflected in the sudden rise in disability for the corresponding months. During March and April, 1918, there was an epidemic of "la grippe" (a total of 409 cases), and during these months the total sickness disability reached very nearly the high level of the recent influenza epidemic.

Table V presents the result of an analysis of 1,432 cases of influenza as to age and sex distribution. About 80 per cent of the male employees of the company were between the ages 20 and 35; 80 per cent of the women were between the ages 17 and 25, both inclusive. The majority of cases among women occurred within the age groups 16 to 30; among men, 26 to 40. Considering the age distribution of all the employees of the company, the figures indicate that the cases of influenza were fairly evenly distributed in proportion to the number of people exposed at the different age groups. A total of 957 cases occurred among females; 475 among males—making the attack rate among the women 23 per cent; among the men, 15 per cent.

TABLE V.—*Age and sex distribution of influenza cases, Chicago Telephone Co.*

Age group.	Males.	Females.	Age group.	Males.	Females.
16-20.....	8	200	41-45.....	41	8
21-25.....	37	447	46-50.....	11	5
26-30.....	128	220	51-55.....	3	1
31-35.....	150	56	56-60 and over.....	8	2
36-40.....	89	18			

The histories of 218 cases of influenza were examined to determine the most common symptoms and complications. Each record contained the certificate of a physician as to the diagnosis, complications, and prognosis, the report of the visiting nurse, including pulse, temperature, respiration, and general symptoms at the time visits were made, usually at three-day intervals, and a report of the findings of the company physician when the patient was ready to return to work.

The most frequent symptoms were high temperature, 101°-103°, weakness and prostration, pain in the back, headache, aches "all over." Occasionally epistaxis and profuse bleeding from the mouth were mentioned. Neuralgia of the face was complained of in one or two cases. The onset in some cases was characterized by chills, fever, and cough; others began as a cold, sore throat, and watering of the eyes and nose. In one case there was a note that the patient attempted to get up and fell on account of weakness. In some cases the patients fainted while at work. Upon examination by the company physicians after recovery, inflamed tonsils were frequently found.

TABLE VI.—*Complications in 218 cases of influenza, Chicago Telephone Co.*

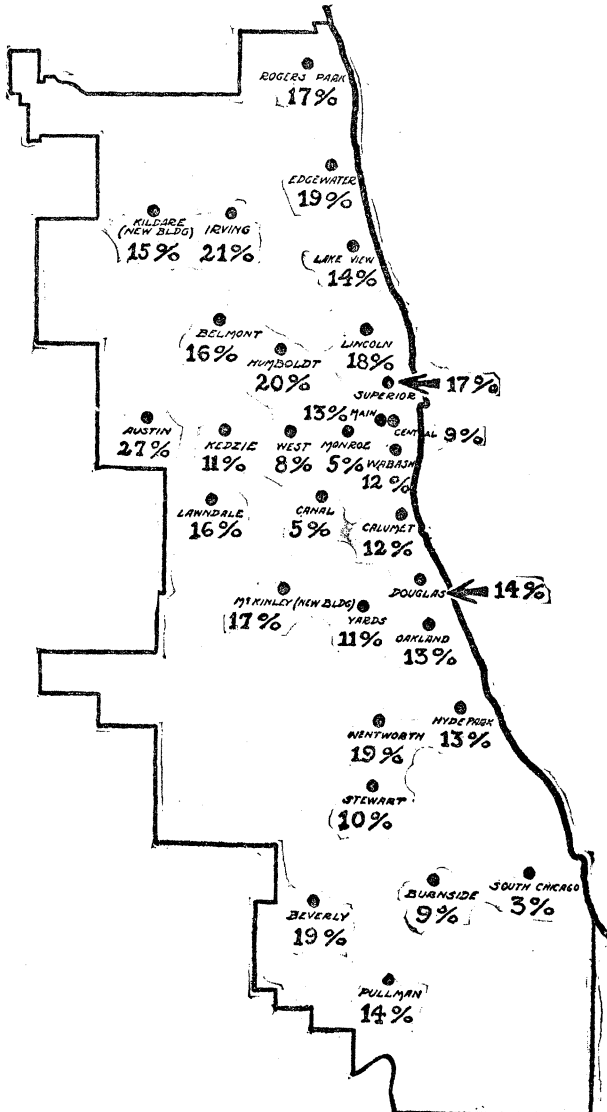
No recorded complications.....	157
Bronchitis.....	45
Pneumonia.....	17
Relapses.....	9
Neurasthenia.....	5
Sinus infection.....	5
Tonsilitis.....	4
Gastritis.....	4
Pleurisy.....	3
Otitis media.....	3
Miscellaneous.....	12

Table VI shows the complications developing in the course of 218 cases of influenza. One hundred and fifty-seven, or 72 per cent, were uncomplicated. The most frequent complication was bronchitis. A distressing complication occurring in 5 cases was a prolonged convalescence, or post-influenzal neurasthenia. Sinus infections occurred in about 2 per cent of cases and otitis media in 1 per cent. Pneumonia was diagnosed in 17 cases, or 7.8 per cent. There were 2 deaths, a mortality of less than 1 per cent.

An analysis of the records of the social service department has enabled us to determine the proportion of girls at the different telephone exchanges who were attacked with influenza. The data include all the employees at the same exchange—those entitled to disability benefits as well as those not entitled. In the case of those entitled to benefits the diagnoses and complications were based upon physicians' certificates as well as upon visiting nurses' records; the remainder were based upon nurses' records alone where no physician was in attendance. The nurses' records included general symptoms as well as observations on temperature, pulse, and respiration.

Table VII shows the number of employees at each exchange, the number who had influenza during the period, September, 1918, to February, 1919, inclusive, and the attack rate. The total number of cases at all exchanges was 1,072, the total number of employees concerned was 7,804 (as of January, 1919), giving an attack rate of 13.7 per cent. The highest percentage attacked by influenza at any exchange was 27, the lowest 3. It was noted by the administrators of the social service department that the largest number of cases developed first on the Northwest side, and it was not until about one month later that the epidemic reached the South side of the city. There were 71 cases of pneumonia recorded among the 1,072 cases of influenza, or a rate for this complication of 6.6 per cent. Only 10 deaths were reported, a mortality rate of less than 1 per cent. An interesting fact bearing upon the source of infection noted in this series of cases, as well as among those entitled to disability benefits,

was that in a great many cases the record was made by the nurse that several or all other members of the family were ill with influenza. Frequently one or more deaths were reported among other



Map showing location of telephone exchanges of the Chicago Telephone Co., and proportion of girls at each exchange attacked by influenza.

members of the family. It is not considered worth while to record the exact number of times such an observation was made because the record of such family infection is manifestly incomplete.

TABLE VII.—*Proportion of telephone operators at the different exchanges, Chicago Telephone Co., coming down with influenza during the period, September, 1918, to February, 1919, inclusive.*

Exchange.	Number of girls at exchange (January, 1919).	Rate of attack.		Exchange.	Number of girls at exchange (January, 1919).	Rate of attack.	
		Number.	Per cent.			Number.	Per cent.
Austin.....	170	46	27	Oakland.....	487	66	13
Belmont.....	178	28	16	Pullman.....	91	13	14
Beverly.....	111	21	19	Rogers Park.....	108	18	17
Burnside.....	11	1	9	South Chicago.....	126	4	3
Calumet.....	206	26	12	Stewart.....	140	14	10
Canal.....	126	7	5	Superior.....	186	31	17
Central.....	549	52	9	Wabash.....	598	72	12
Douglas.....	153	22	14	Wentworth.....	335	63	19
Edgewater.....	312	59	19	West.....	171	14	8
Humboldt.....	248	49	20	Yards.....	274	31	11
Hyde Park.....	348	46	13	Toll.....	416	61	14
Irving.....	177	36	20	Operators' training.....	40	5	12
Kedzie.....	265	31	11	Pay station.....	110	10	9
Kildare.....	67	10	15	Traffic department.....	100	9	9
Lake View.....	352	52	14				
Lawndale.....	221	35	16	Total.....	7,804	1,072	13.7
Lincoln.....	180	32	18				
Main.....	586	80	13	Total pneumonia cases.....		71	6.6
McKinley.....	86	15	17	Total deaths.....		10	1
Monroe.....	276	13	5				

SUMMARY.

The data for the several groups may be brought together as follows:

TABLE VIII.

Group.	Number of individuals.	Influenza attack rate per 1,000.	Case fatality rate.	Clinically diagnosed pneumonia to 100 influenza cases.
1. Student Army Training Corps, section A.....	685	39	0	7.7
2. Student Army Training Corps, section B.....	234	398	2	13
3. Pupils, elementary school, University of Chicago.....	391	248	0	0
4. Pupils, high school, University of Chicago.....	427	213	0	2.2
5. Teachers, elementary and high schools.....	63	175	0	0
6. Chicago Telephone Co., employees eligible for disability benefits.....	¹ 7,530	192	1.5	² 7.8
7. Chicago Telephone Co., women employees at exchanges.....	7,804	137	1	6.6

¹ Includes about 40 per cent of group 7.

² Based on 218 cases.

With respect to age the figures show a higher attack rate among the pupils of the university elementary school (ages 4–13) than among those of the high school (ages 14–18); the teachers in these schools had a lower attack rate than the pupils. Apparently a definite selective age incidence is manifested, since the pupils in these schools are from the same section of the city and to a large extent from the same families, and were presumably exposed in similar degree.

With respect to sex there was no noteworthy difference among the pupils in the high and elementary schools (attack rates, 230 for boys,

231 for girls). It is fair to assume that the chances for acquiring infection were substantially the same for these children and that one sex was as much exposed to infection as the other. Among the employees of the Chicago Telephone Co., on the other hand, the men were affected in considerably lower proportion than the women (151 per 1,000 for men, 233 for women). Probably the age factor was largely responsible for this difference, since the women employees are of a much lower average age than the men.

Illness reported under the heading of "Colds," etc., seems to have been at a considerably higher level during the autumn of 1918 than during the corresponding period of 1917. This was particularly the case among the pupils of the university schools and to a somewhat lesser degree among the employees of the Chicago Telephone Co. Comparison of the reported cases of influenza and colds in the latter group for the months September–November suggests that some cases of influenza were reported under the former heading.

The differing degrees of incidence in the various groups here considered are especially striking. The attack rate among the employees at the various Chicago telephone exchanges ranged from 30 to 270 per 1,000, although the working conditions in the several exchanges were not materially different. The highest attack rate recorded for any group occurred among members of one section of the Student Army Training Corps at the University of Chicago (398 per 1,000), while the lowest (39 per 1,000) was among the members of the other section of the same corps. The former group was particularly exposed to infection, while the latter, although composed of men of similar ages, living under substantially similar conditions with those of the first group, were guarded to a considerable extent against contact with beginning cases.

The data obtained in regard to the schools apparently indicate that the schools were not important distributing centers for the infection. No explosive outbreak occurred in any one grade, and the four days of the Thanksgiving holiday evidently afforded more favorable opportunities for infection than did the days of regular school attendance. The low pneumonia incidence and the absence of deaths among the pupils of these schools (188 cases) is noteworthy.

The influence of careful supervision of a somewhat segregated group of individuals is shown by the low attack rate in section A of the Student Army Training Corps.